

IAS Critical Design Review



Agenda

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|----------------------------------|--------------------------------|
| • Introduction | R. Schweiss |
| • Design Overview | S. Johnston |
| • Hardware Architecture | C. Brambora |
| • Operational Scenarios | S. Johnston |
| • Software Design | |
| – Overview | J. Hosler |
| – Operations Interface | J. Whelan |
| – Management and Control | A. Williard |
| – Database | A. Williard |
| – L1 Processing | T. Ulrich |
| | J. Storey |
| – Evaluation and Analysis | D. Kaufmann/M. Schienle |
| • System Test | E. Crook |
| • Conclusion | R. Schweiss |

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- **Primary IAS Tasks**
 - **Assess quality of L0R Products**
 - **Process images to 1R and 1G levels**
 - **Characterize radiometric artifacts**
 - **Assess geometric accuracies and registrations**
 - **Calibrate instrument and spacecraft**
 - **Radiometry using multiple calibration sources**
 - **Sensor alignment, scan mirror and band placement**
 - **Support anomaly investigation**

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IAS Assessment Table

Scene Type	# to order/ quarter	# to Process /Level	Assessments and Calibrations	Outputs/Reports
Random Day Scene	90	90 /1Gs	Level 0R Product Quality (Table 3.2.2.4-1) Detector Operability Detector Saturation Impulse and Random Noise Banding and Striping	Daily Assessment Report
Geodetic Test Site	6-24	(1) 12-48/1Gs	Geodetic Accuracy Sensor Alignment	Calibration Reports for each Quarterly Report/CPF Update
Geometric Super-Site	2-6	(2) 4-12/1Gt	Scan Mirror Calibration I-I Registration Assessment	Calibration Reports for each Quarterly Report/CPF Update
Focal Plane Cal. Image	4-12	4-12/1Gs	B-B Registration Assessment Band Placement Calibration	Calibration Reports for each Quarterly Report/CPF Update
Night Scenes	(3) 20-44	20-44/1R	Characterize Coherent Noise Char. Scan Correlated Shift Characterize Memory Effect	Assessment Report for each Quarterly Report
PASC Data	(4) 180	180/1Rp	Characterize Memory Effect Rel. Radiometric Accuracy	Calibration Report for each Quarterly Report/CPF update
FASC Data	(5) 8-30	8-30/1Rf	Characterize Coherent Noise Char. Scan Correlated Shift Characterize Memory Effect Rel. Radiometric Accuracy	Calibration Report for each Quarterly Report/CPF update
MTF Image			Characterize MTF	Assessment Report for each Quarterly Report/ CPF update
Ground Look Calibration	1	1/1Gt	Absolute Rad. Accuracy	Calibration Report

(1) For each of the 6-24 scenes, process PAN band once to 1G systematic using PCD ephemeris and once again using FDF definitive ephemeris for a range of 12-48.

(2) For each of the 2-6 scenes, process PAN band to 1G systematic and then to 1G terrain corrected.

(3) Optimally, a 20 scene interval is desired once per quarter. Additionally, the non-bright scenes acquired with the PASC images will be ordered 2 per week.

(4) PASC imaging is scheduled once per day, each PASC acquisition is approximately 6 scenes in length with the bright area of interest covering 2 scenes that will be ordered (90x2). Each scene will be processed to 1R level using a unique PASC processing algorithm.

(5) FASC imaging is scheduled once every six weeks, therefore could be acquired once or twice in a quarter. There are two types of FASC imaging; one collecting 8 scenes when done in conjunction with PASC imaging and one collecting 15 images when done on a stand alone basis.



IAS User Types

- **Operators**
 - Process image data and monitors the system
 - Order data from DAAC
 - Generate MOC requests, DAAC transfer requests & CPF
 - Transfer files
 - Setup, modify and monitor Work Orders (WOs)
 - Monitor system status, messages and alerts
 - Query Database
 - Startup/Shutdown of IAS software
- **Analysts (Radiometry and Geometry)**
 - Display and edit IAS data
 - Analyze IAS data
 - Generate Reports
 - Submit Jobs



Scenarios

- **Ordering Data**
 - MOC Acquisition Requests
 - Level 0R data from DAAC
- **Defining a Work Order**
 - Standard Processing Procedures
 - Work Order Setup
- **Analyze Results**
- **Generation of Primary Output Products**
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Generate MOC Request



- **Calibration Scene Request**
 - User specifies if this is a PAC/FAC (orbit number based) or Ground Look Calibration (WRS path/row based) request
 - Tools available for orbit number and path/row determination
 - COTS tool to display ground track
 - Weekly MOC AN/DN file (includes times, longitudes, and orbit numbers)
 - User fills in a form specifying the appropriate information
 - Multiple requests may be put into a single request file
 - Requests are tracked in the database



Generate MOC Requests (continued)

- **Concentrated Ephemeris Request**
 - User fills in a form specifying the start and end times for the requested data or selects a LOR product and the times are automatically extracted
 - Multiple requests may be put into a single request file
 - Request file is created and staged for transfer to the MOC
 - Requests are tracked in the database

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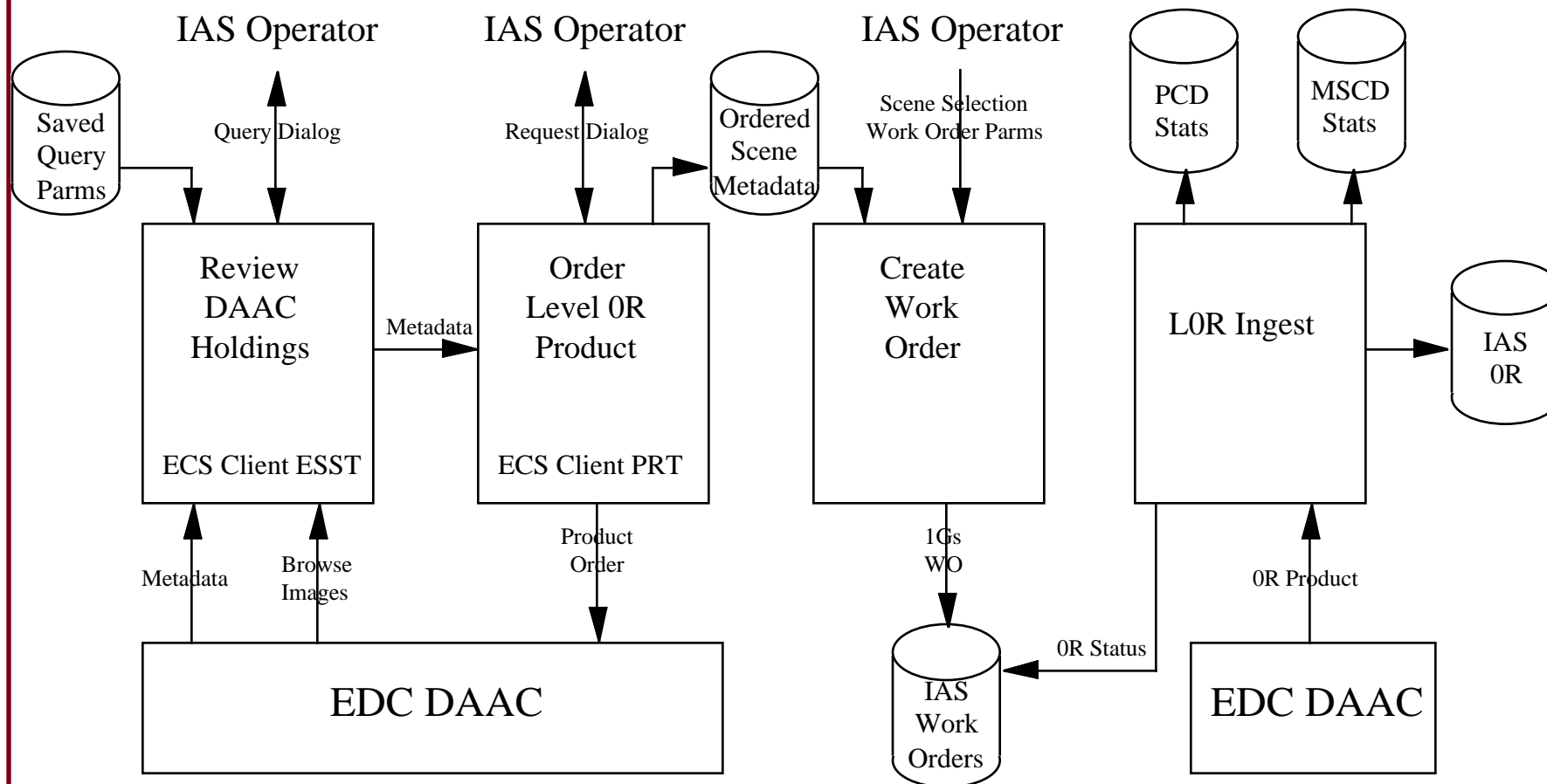
Order Data From DAAC

- **Connect to DAAC via Web Browser**
- **Query/browse for desired scenes**
- **Select and order scenes**
- **Create IAS Work Order with corresponding scene ids**
- **DAAC notifies IAS when data is available and IAS ftps data**
- **Data products are checked for completeness**
- **IAS catalog updated with data product information**
- **Received data products checked against outstanding Work Orders and operator notified if no matches found**

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Order and Receive Data



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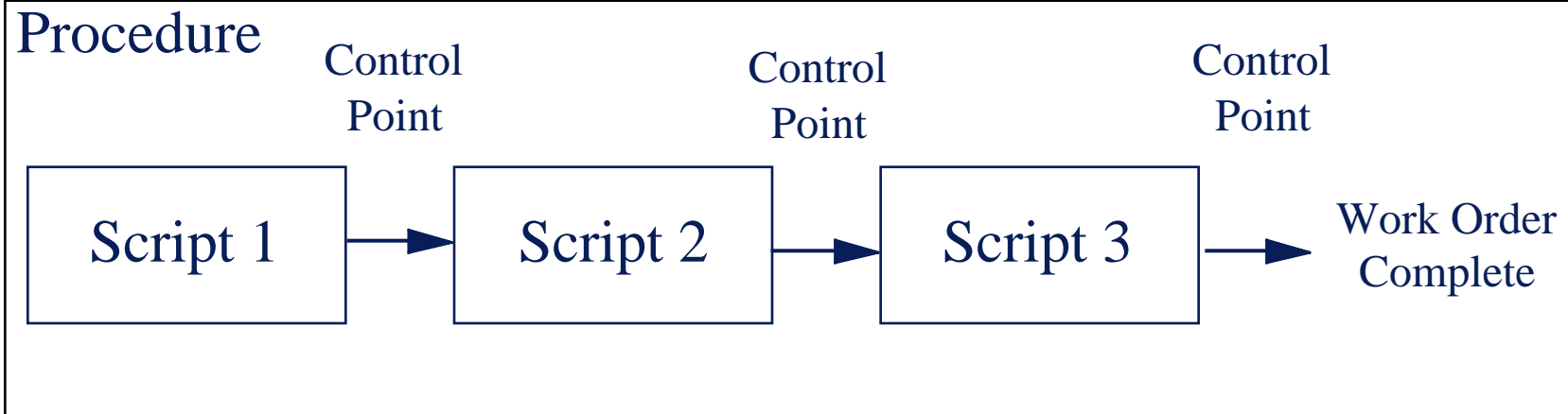
Scenarios

- **Ordering Data**
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What is a Work Order?

- **A Work Order is the set of input data, control parameters, and the procedure for processing a LOR input product.**
- **Named procedures consist of a set of processing scripts**
- **Scripts execute application programs to process data**
- **Application programs obtain input parameters as needed**
- **Process Control System controls the execution of the scripts**
- **Scripts can be set to pause when complete for analysis of results**





Standard Processing Procedures

- **PASC Scenes**
- **FASC Scenes**
- **Night Scenes**
- **Day Scenes**
 - **Level 1Gs**
 - **Level 1Gp (interactive and automated)**
 - **Level 1Gt (interactive and automated)**
 - **Geodetic accuracy**
 - **Sensor alignment calibration**
 - **Geometric supersite**
 - **Image registration**
 - **Band to band registration**



Work Order Setup

- **New Work Order**
 - User specifies a new Work Order and a form is displayed for the user to enter information
 - List of values and default values are supplied where appropriate
 - Input data is specified, if known
 - User selects processing procedure to apply to the input data
 - Processing parameters associated with the processing procedure are selected
 - Work Order is committed to the system
 - Process Control Subsystem will schedule the Work Order for processing once all required input data are available

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Work Order Setup (Cont'd)

- **Modify Existing Work Order**
 - User queries system for existing Work Order
 - Work Order attributes are displayed and the user may make and commit changes
- **Fields associated with Work Order setup**
 - work order number (generated by system)
 - date entered (generated by system)
 - requester (generated by system)
 - priority
 - request type
 - requested completion date
 - processing procedure (submenu for input parameter selection)
 - input data specification
 - comments

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Analysis of Results

- **Execution of a processing procedure results in trending and calibration information**
- **Results may be reviewed at the end of each script or at the completion of the Work Order**
 - **Dummy scripts may be created to inform analyst of specific analysis steps needed**
- **Processing history logs and intermediate products are generated in a Work Order specific directory**
- **E&A functions are used to view and analyze intermediate products and end results**
- **Cleanup of temporary files and archive of status files will begin once analyst has indicated that their review of the results is complete**



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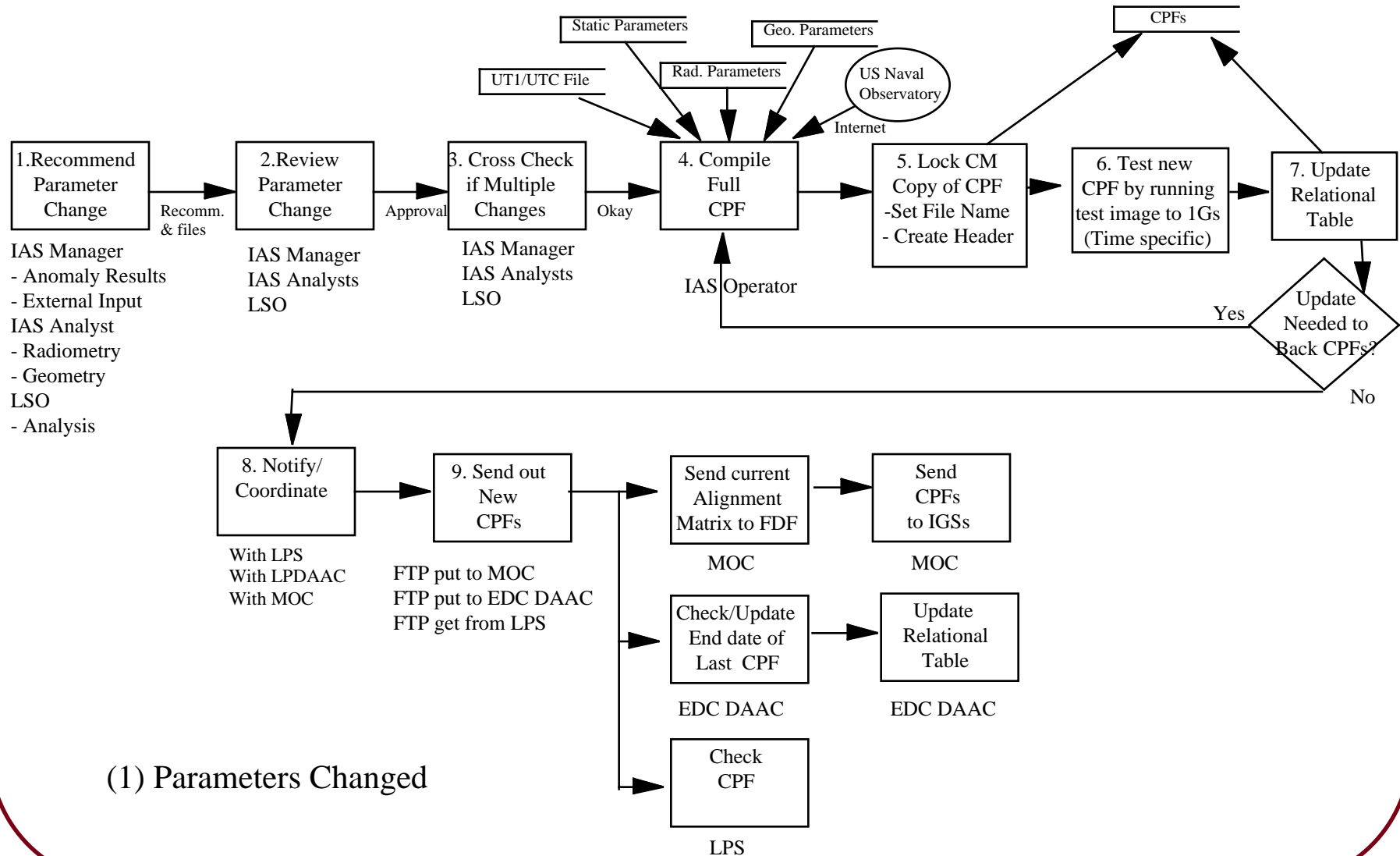
Generate Calibration Parameter File

- **Calibration parameter files are generated and maintained in ODL files**
- **To generate a new CPF the user runs a tool to process and write the calibration information to a named ODL file**
- **The database is updated to indicate that a new CPF has been generated**
- **The new CPF is reviewed/verified before being released for distribution**

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Update Calibration Parameter File (1)



(1) Parameters Changed

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Backup Notes for CPF Scenario (1)

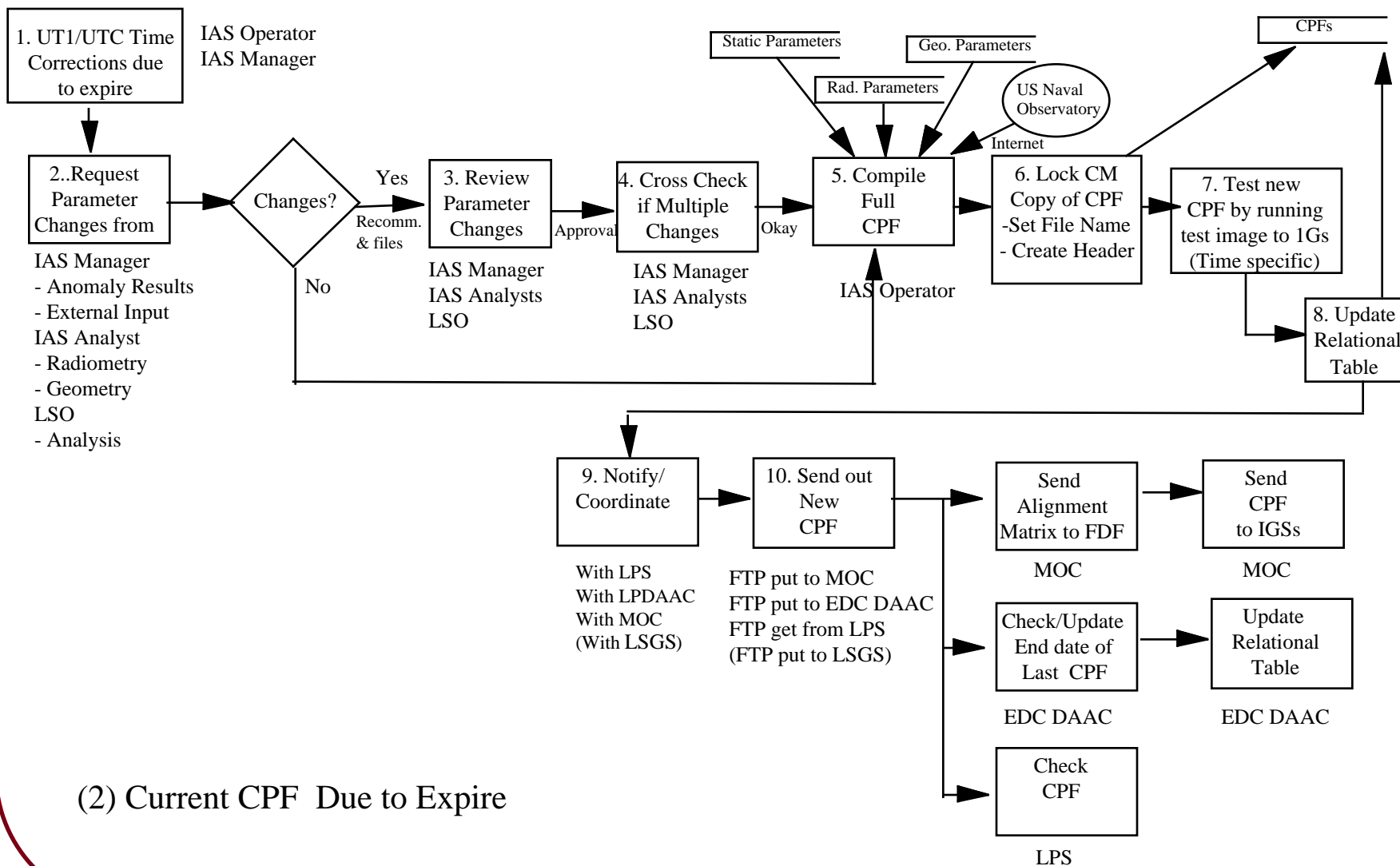
1. Each of the entities that can make recommendations (IAS Manager, IAS analysts, and LSO) may be working with different subsets of the information which comprise the CPF such that a recommendation for use of new parameters would have to come with the appropriate file name and location. An analyst or operator would use these subset files to update the database (before or after review?) and then generate the CPF. There are four components of the CPF (see box 4) and analysts/scientist can be working with either the radiometry file and/or the geometry file.
- 2 & 3. The full team (IAS Manager, analysts and LSO staff) will review proposed parameters changes and cross check their effects on each other if there are multiple changes.
4. The full calibration parameter file (CPF) will be compiled from the four components (static values, approved radiometry file, approved geometry file, and appropriate time correction file that will be retrieved from the US Naval Observatory site via the internet).
For previously transmitted file updates, the appropriate time correction file will be obtained from the IAS database for inclusion.
5. The configuration managed (CM) version of the file is saved and the file name (format in the CPF document) and the header (containing effective start date and end date) are created.
6. As a quality check, the newly generated CPF will be used to create a 1Gs image and checked. The image selected must match the time frame in which the CPF is effective.
7. The relational table is envisioned to contain effective dates (with no overlapping times) and the corresponding CPF file names to be used for that time span.
- 7a. If it is necessary to update previously transmitted CPFs, then new CPFs for past time frames must be compiled, checked, given new file names and headers, the relational table updated and transmitted to the appropriate Landsat 7 elements also. The loop will continue until no more back (or previously transmitted) files need to be updated.

Steps after step 9 are not within the IAS.

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Update Calibration Parameter File (2)



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Generate Reports

- **The following products are generated as a result of the analysis of the Work Order processing:**
 - **Relevant assessment (or characterization) reports**
 - **Radiometric artifacts**
 - **Applicable geometric characterizations**
 - **Level 0R product quality assessment**
 - **Calibration report if required number of scenes are present**
- **As required, the IAS will generate:**
 - **Problem reports**
 - **Anomaly investigation reports**
- **IAS produces quarterly and annual summary reports regularly**



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Anomaly Resolution

- The same tools used in normal processing are available for anomaly resolution and “what if” processing.
- Analyst sets up Work Order using standard or custom scripts
- Analyst can control execution of scripts (e.g. go backwards in procedure to rerun scripts)
- Results are “tagged” to differentiate them from normal processing runs
- The analyst may require trending data from the MOC to aid in the analysis of an anomaly. Request to the MOC for trending reports are made via an IAS Problem Report.